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09/896,798	06/29/2001	Jiebo Luo	83025THC	8281

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EXAMINER

THOMPSON, JAMES A

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 11/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Advisory Action
Before the Filing of an Appeal Brief**

Application No.

09/896,798

Applicant(s)

LUO ET AL.

Examiner

James A. Thompson

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--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 06 October 2005 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

- a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
(a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
(b) ☐ They raise the issue of new matter (see NOTE below);
(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: see attached. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☒ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
The status of the claim(s) is (or will be) as follows:
Claim(s) allowed: _____.
Claim(s) objected to: _____.
Claim(s) rejected: 1-26.
Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: see attached.
12. ☒ Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). 10/6/05
13. ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The proposed amendments to the claims would change the scope of the present claims. Therefore, the **proposed amendments to the claims will not be entered.**

Response to Arguments

2. Applicant's arguments filed 06 October 2005 have been fully considered but they are not persuasive.

Regarding page 7, line 4 to page 8, line 21: Examiner agrees with Applicant that Murayama (US Patent 5,936,684) does not expressly disclose that the step of calculating specifically follows the step of assigning. However, the limitations under dispute are part of the proposed amendments to the claims, which have not been entered. While Murayama does not expressly teach the limitations under dispute, Examiner will need to further consider the claims and perform a further search for relevant prior art.

Regarding page 8, line 22 to page 11, line 3: Examiner agrees with Applicant that neither Murayama nor Revankar (US Patent 5,649,025) expressly teach "repeatedly revising the clustering of the pixel values into the reconstruction levels *until error between the N level digital image and the M level digital image is minimized*" [emphasis added], as recited in claim 16. However, as with above, the limitations under dispute are part of the proposed amendments to the claims, which have not been entered. Examiner also agrees that steps s2-s5, shown in figure 1 of Murayama, are not compatible with the language of the proposed amendments to claim 16. While Murayama in view of

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Revankar would teach repeatedly revising the clustering of the pixel values into the reconstruction levels until a particular stopping point, Murayama in view of Revankar would not teach performing said repetition until error between the N level digital image and the M level digital image is minimized. While Murayama does not expressly teach the limitations under dispute, Examiner will need to further consider the claims and perform a further search for relevant prior art.

Regarding page 11, line 4 to page 14, line 14: The k-means clustering algorithm is a classification algorithm which assigns each point of a data set to the cluster whose center (also called centroid) is nearest. The center is the average of all the points in the cluster, i.e. its coordinates is the arithmetic mean for each dimension separately for all the points in the cluster. The k-means algorithm maximizes inter-cluster (or minimizes intra-cluster) variance, but does not ensure that the solution given is not a local minimum of variance.

In Murayama, "[t]he number of cumulative pixels for increasing brightness in the histogram (figure 2b of Murayama) are used to determine the threshold values (column 8, lines 39-43 of Murayama). The total number of cumulative pixels are divided by the number of levels (M, or n in Murayama) that are used for the image reconstruction (column 8, lines 37-38 of Murayama), and thus the number of clusters (K) is equal to the number of reconstruction levels (M)" [see page 6, lines 5-12 of said previous office action]. By distributing the clusters based on a histogram and dividing the total number of cumulative pixels by the number of levels, Murayama forms k clusters which are spread out according to the distribution of pixel value frequencies. Thus, the inter-cluster variances are maximized

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and the intra-cluster variances are minimized. On page 13, lines 18-24 of Applicant's present arguments, Applicant supplies a general algorithm for k-means clustering. With respect to the teachings of Murayama, the classification of n samples according to the nearest μ_i , which corresponds to the i -th threshold value, is performed only once. Since global threshold values are used for the entire image, further recursion of the k-means algorithm is not required. It is only when threshold values are determined for multiple sections, such as according to the teachings of Revenkar, that more than one iteration of the k-means clustering algorithm is required. While Murayama may not specifically use the words "k-means clustering", the teachings of Murayama clearly fall within the generally accepted understanding of k-means clustering. The precise type of k-means clustering used in Murayama may not be the same as taught in Applicant's specification (e.g., k-means clustering based on Euclidean distance, which is used to assign pixel values to each cluster center), but such specifics of Applicant's k-means clustering have not been recited in the present claims.

Regarding page 14, line 15 to page 21, line 13: Applicant has demanded documentary support for the proposed "common result" [page 18, lines 1-5 of Applicant's present arguments]. As has been clearly demonstrated in said previous office action, both Murayama and Ishiguro (US Patent 6,501,566 B1) teach the setting of threshold values through the use of histograms (figures 2a and 2b; and column 3, lines 25-37 of Murayama; and figure 7; and column 7, lines 23-26 and lines 60-65 of Ishiguro). In Murayama, a rapid change in the cumulative frequency can determine the placement of threshold values (see figure 2b(e.g., "th[1]") of Murayama). In Ishiguro, it is the

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highest peaks in the non-cumulative histogram that determine where a threshold is to be set (see figure 7 and column 7, lines 23-26 and lines 60-65 of Ishiguro). For a particular data set, a high peak at one point in a corresponding *non-cumulative* histogram results in a rapid rise in the value of a *cumulative* histogram at the same point. Thus, the difference between the histogram-based threshold setting taught by Murayama and the histogram-based threshold setting taught by Ishiguro is merely the manner in which the data is *represented*. The pixel data itself is the same and the setting of the thresholds based on said pixel data operates in the same fashion. It is merely the manner in which Murayama and Ishiguro choose to *depict* the pixel data that is different. In both Murayama and Ishiguro, when the number of pixels of a certain pixel value is large, a threshold is set either at that point or near that point.

Applicant then argues that sufficient motivation has not been given. While Applicant is correct in stating that the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient *by itself* to establish *prima facie* obviousness, Examiner has not relied upon merely the fact that the claimed invention is within the capabilities of one of ordinary skill in the art. As Examiner has clearly demonstrated on page 7, lines 24-28 of said previous office action, using a non-cumulative histogram in the manner taught by Ishiguro has the effect of reducing the degradation of image quality when error diffusion is performed in image halftoning systems (column 2, lines 57-65 of Ishiguro). Further, as demonstrated above and in the arguments regarding page 8, line 5 to page 10, line 15 on pages 2-3 of said previous office action, the difference between Murayama and Ishiguro is

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based on the manner in which the pixel data is *represented*, and is not based on how the pixel data is actually processed. In Murayama, the pixel value frequency is represented as a cumulative histogram, and in Ishiguro a non-cumulative histogram is used to represent the data. Clearly, the mere use of an optional mathematical *representation* of data does not change the fact that both Murayama and Ishiguro set threshold values based on changes in the frequency of pixel values.

Regarding page 21, line 14 to page 24, line 29: Applicant alleges that the combination of Murayama and Revankar in Examiner's rejection of claim 21 is improper. In support of this allegation, Applicant states that "[o]ne of ordinary skill in the art would not be motivated to combine Murayama with another reference in order to provide a feature that was already present" [page 23, lines 8-9 of Applicant's present arguments]. Examiner replies that the features taught by Revankar that are relied upon in the rejection of claim 21 is said previous office action are not present in Murayama. If so, Murayama alone would have been sufficient. Furthermore, despite Applicant's allegations to the contrary, combining the teachings of Revankar with the primary teachings of Murayama would not render the resultant system non-functional. While the system of Murayama combined with Revankar would require additional calculations as compared with the system of Murayama alone, this in no way causes the system to become non-functional. It is not the standard for obviousness that the proposed combination work perfectly, or even as efficiently or effectively as the system taught in the primary reference. "The prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. *In re Merck & Co.*,

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Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)" (see MPEP §2143.02). Modifying Murayama such that each region has multiple thresholds, as taught by Revankar, instead of using a global set of multiple thresholds, as taught by Murayama, clearly has a reasonable expectation of success, and can thus be relied upon as a proper basis for an obviousness rejection. The mere fact that the proposed combination may add additional computations and additional thresholds, as suggested by Applicant on page 24, lines 9-10 of Applicant's present arguments, does not cause the proposed combination to become non-functional.

Applicant further alleges differences between the cited prior art and claim 21 (page 24, lines 22-29 of Applicant's present arguments). Revankar has been relied upon to teach *recursively* performing the thresholding operations until a stopping point is reached, as shown on page 15, lines 9-15 of said previous office action. As demonstrated on page 15, lines 16-30 of said previous office action, the thresholding steps themselves are taught by Murayama. The recursive aspect is taught by Revankar and the full language of claim 21 is taught *by combination*.

Regarding page 24, line 30 to page 26, line 7: The recursion taught by Revankar includes the determination of a stopping point. Thus, it is the teachings of Revankar, combined with the teachings of Murayama, which would halt the recursive calculation of steps s2-s5, shown in figure 1 of Murayama. Since Murayama does not teach recursion, then clearly Murayama alone will not show the recursive aspects taught by Revankar. Claim 22 depends from claim 21. In the rejection of claim 21, Examiner has demonstrated that Revankar teaches a recursive

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stopping point (see page 15, lines 9-15 of said previous office action). Again, it is the combination of Murayama and Revankar which causes the processing of steps s2-s5 of figure 1 of Murayama to stop at some predetermined stopping condition.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



31 October 2005

James A. Thompson
Examiner
Art Unit 2624



THOMPSON
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PRIMARY EXAMINER